Audi gears up for continued success with IBM private cloud

AUDI AG, part of the Volkswagen Group, is a leading global car manufacturer operating in the premium vehicle segment. With three brands – Audi, Lamborghini and Ducati – the company has eight production plants worldwide and a range that runs from small luxury family cars to high-performance supercars. Audi Group employs more than 65,000 people globally, and delivered more than 1.3 million premium cars to customers in 2011 – the highest output in its corporate history.

In common with many other major automotive companies, Audi had implemented SAP® ERP to manage many aspects of its business operations, from human resources and cost control to supply chain and plant maintenance. Over time, the company had expanded its SAP environment to encompass around 100 separate systems, running on 12 HP servers with Oracle databases and an additional

24 HP blades. The company wanted to improve its IT efficiency, both in order to reduce capital and operational costs and in order to create a greener infrastructure, which was one of the key projects within the company's sustainability strategy. Equally, it wanted to increase the availability and performance of its SAP systems, while making them much more scalable and flexible. In more general terms, the IT Services Department at Audi was also tasked with helping the company to face up to several broad business challenges, including: increasing demands from employees, customers and suppliers; the need to support new technologies; rising cost pressures; and growing competition. These challenges required the IT Services Department to strengthen its business process management capabilities, to enable greater focus on core competencies, and generally to improve the professionalism of its project management, service and delivery processes.

Overview

Challenge
AUDI AG builds family, sport and luxury supercars, competing with global auto companies. As low-cost manufacturers develop their own brands, Audi seeks to turn the tables by creating super-efficient business processes.

Solution
Audi migrated more than 100 SAP systems from HP-UX with an Oracle database to IBM AIX with IBM DB2.

Key benefits
Audi has accelerated information flow and business flexibility. New systems deliver manufacturing, operational, marketing and sales information, enabling the company to drive out cost while supporting its world-famous Audi, Lamborghini and Ducati brands.

The IT Services Department at Audi needed to help the company address several broad business challenges, including: increasing demands from employees, customers and suppliers; the need to support new technologies; rising cost pressures; variable sales volumes; and growing competition. These challenges required the IT Services Department to step up to a new level of business awareness, progressing from the management of IT resources to the management of business service provision. One obstacle was the growing complexity of the IT infrastructure. Equally, the business-critical SAP ERP environment had grown to encompass around 100 separate systems, running on HP servers with Oracle databases. The company needed to improve the efficiency of this landscape, both in order to reduce capital and operational costs and in order to create a more sustainable and green infrastructure. Equally, it wanted to increase the availability and performance of its SAP systems, while making them much more scalable and flexible for short-term requirements.

Selecting the cloud option

Audi decided that an implementation which is ready for a private cloud would be the best option for the future: building a completely virtualized infrastructure with the ability to add or remove computing capacity on demand. This would solve the immediate issues with the SAP environment, and also create a new approach to managing and delivering IT services whereby the IT Services Department could focus on desired business outcomes rather than on low-level infrastructure concerns.

Markus Wierl, Service Owner SAP Infrastructure, AUDI AG, explains: "We wanted to create a flexible virtualized infrastructure that would enable us to grow and add new services without needing to consider the underlying hardware or any other constraints. The IBM Power Systems™ offerings were highly attractive because of their mature virtualization capabilities. So we invited IBM to propose two options: one using our existing Oracle database, and one with the IBM DB2® database."

Proving the IBM concept

The IBM proposals suggested that the DB2 option would not only offer significantly better interactive and batch

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performance, but also that it would use considerably less disk capacity. Audi requested hard evidence for the DB2 claims. With the Audi IT team keen to finalize the deal within a strict deadline, IBM worked fast to build a successful Proof-of-Concept (PoC) for the new private cloud ready infrastructure for SAP. "We were impressed that IBM was able to organize the Proof-of-Concept

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in only three weeks," says Markus Wierl. "IBM created an environment that enabled us to compare DB2 9.7 with a reorganized Oracle 10g database, both running on IBM Power Systems servers. The results were clear: storage savings in the range of 50 to 70 percent, and much higher performance when using DB2." He adds: "We visited the IBM SAP International Competence Center and learnt more about the partnership and long-term collaboration between the two vendors. We also heard from SAP that they themselves use IBM DB2 to develop their software,

which convinced us that migration was not a risky option. Combined with the virtualization capabilities and performance of the IBM servers we decided that our strategic platform for SAP should be DB2 and IBM Power Systems."

Large-scale migration

Audi moved ahead with the proposed solution from IBM: the creation of a 'private-cloud ready' infrastructure with SAP databases on DB2 on four IBM Power® 570 servers and SAP application servers on 21 IBM BladeCenter® PS702 Express servers. The key to the success of the solution was the migration process. It was necessary to migrate more than 100 SAP systems from HP-UX to IBM AIX® 6.1 and from Oracle 10g to IBM DB2 9.7.

Working with IBM Systems and Technology Group and IBM Global Technology Services®, Audi successfully migrated the SAP systems – one third of them production systems. The migration took just six months to complete. The combined team added several new SAP systems to the new platform since the start of migration and the environment continues to grow in this way.

Solution

Working with IBM Systems and Technology Group and IBM Global Technology Services and IBM Software Group, Audi migrated more than 100 SAP systems (including more than 30 SAP landscapes and 26 high-availability clusters) from HP-UX with Oracle 10g database to IBM AIX 6.1 with IBM DB2 9.7. This huge migration was completed in just six months, with no disruption to Audi's business. The SAP landscape now runs on dual-data-center, symmetrically implemented 'private cloud ready' infrastructure, with the infrastructure hosted by Audi and managed by IBM, based on four IBM Power 570 servers each with 32-core IBM POWER6 processor technology (migration to IBM POWER 7 planned in 2012) and 512 GB memory for the SAP database and central instance, and two IBM BladeCenter solutions with a total of 21 PS702 Express blades, 18 of which are configured with 16 IBM POWER7 processor cores and run the SAP application servers. Of these 18 blades, 14 have 256 GB memory and four have 128 GB memory. The remaining three PS702 Express blades have four POWER7 processor cores and 16 GB of memory, and are used to run the systems and application monitoring and management.

Business Benefits

The IBM Power Systems and BladeCenter hardware requires 20 to 40 percent less energy than competing solutions from other vendors, while delivering higher performance and availability. The IBM solution provides valuable savings in physical space, infrastructure costs and cabling. With on-demand server capacity, Audi can expand and shrink processing capacity on the fly, switching on additional processors and memory on a temporary basis and paying only for what is used, enabling it to synchronize its IT capabilities and costs with changing patterns in external demand. The ability to switch on space capacity also enables greater business growth within the existing infrastructure, minimizing future business disruption and providing a stable configuration for years to come.

The initial migrations were handled at a rate of between two and five SAP systems per week – this fast-paced approach and the criticality of the business systems made it vital for Audi to have a strong partner with a rigorous approach to project management and risk mitigation.

The only available time for the migrations was over weekends, and all systems needed to be operational again in time for the restarting of the manufacturing production lines each Monday morning. The combined IBM and Audi team successfully completed all the migrations with no disruption to Audi's business.

"The outstanding collaboration between the various parts of the IBM team and our team ensured that we overcame all potential areas of risk during these highly complex migration projects," says Markus Wierl. "The positive results we saw in the Proof-of-Concept have been reflected in our production environment, and the business is already seeing the benefits. We have improved system performance and adherence to SLAs, and we have also reduced our energy requirements and costs for IT through virtualization."

IBM provided a highly professional migration service that took into account

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all the potential business risks and took steps to mitigate them. The IBM project team was able to call on the experience and knowledge of IBM's global pool of SAP, DB2 and Power Systems experts, including IBM GTS Migration Factory, ensuring that the migrations were completed on schedule and without any service interruptions.

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Robust and efficient platform

The new landscape for SAP at Audi is based around four IBM Power 570 servers with a total of 80 active IBM POWER6® cores, running the SAP database and central instance. The virtual AIX servers in this environment are all clustered for high availability using IBM PowerHA®. A further 48 POWER6 cores are available on demand – and Audi effectively only pays for these as it uses them. The Power Systems servers have a total of

1.5 TB memory, with a further 0.8 TB available on demand, and can scale from 745,000 to 850,000 SAPS with SAP ERP.

Audi's contract with IBM includes a provision for upgrading the current Power Systems servers to four Power 770 servers with POWER7® processors in 2012 which will offer up to 1.1 million SAPS with SAP ERP. The total potential of the IBM cloud ready solution could be extended almost infinitely, giving Audi plenty of headroom for business growth.

The SAP application, management and monitoring servers also run on AIX 6.1, on 21 IBM BladeCenter PS702 Express servers. Of these, 18 are configured with 16 IBM POWER7 cores and three with four IBM POWER7 cores. The IBM BladeCenter servers offer a total of 300 POWER7 cores supported by 4.14 TB memory to operate and monitor Audi's SAP applications.

Audi's SAP Infrastructure is operated by IBM. The chosen solution offered significant benefits over competing options, including 20 to 40 percent greater energy efficiency projected over four years. This comparison, made by Audi itself, was for the new IBM hardware against the new hardware from two other vendors. The higher

Key Solution Components

Industry
Automotive

Applications
SAP ERP components including financials, cost controlling, production management, logistics, SAP Customer Relationship Management, SAP Supplier Relationship Management, SAP NetWeaver Portal, SAP e-recruitment, SAP ERP Human Capital Management, SAP Netweaver Business Warehouse

Hardware
IBM Power 570, IBM BladeCenter PS702 Express

Software
IBM DB2 9.7 with DB2 encryption feature

Services
IBM Software Group, IBM Global Technology Services

energy efficiency not only enabled IBM to offer keen pricing for hosting the solution, but also enabled Audi to meet its internal requirements for a green and sustainable solution. The use of DB2 compression also helps here, by significantly reducing the total database size and therefore the number of disks that the environment requires.

The SAP solutions used by Audi include human resources, business warehouse, financials, cost controlling, client relationship management, supplier relationship management, portals, production, logistics and an e-recruitment solution. While IBM manages the hardware, operating system and virtualization, Audi manages the SAP solutions, SAP basis and DB2.

Cloud for flexibility and speed

The private cloud infrastructure based on IBM Power Systems and BladeCenter servers offers Audi high availability and performance, and enables the rapid provisioning of new LPAR's as well as the addition

of on-demand computing resources to existing systems. Audi has known costs for hardware and services with transparent pricing and on-demand billing. The IBM solution provides a day-based capacity pricing model, giving Audi the ability to precisely flex its IT resources and costs up and down as business requirements change.

Server virtualization using IBM PowerVM® is the corner-stone of the new solution. It enables Audi to pack a large number of separate business systems onto a small number of physical servers, pushing up utilization and largely eliminating costly unused capacity. The use of virtualization also enables greater flexibility and responsiveness. Rather than having each logical system tied to a particular physical server, and only able to expand through the physical addition of new hardware, Audi can reallocate resources on the fly from one system to another as required.

With the Live Partition Mobility feature of IBM PowerVM, live systems can be moved even from one physical server to another without any loss of service. The use of server virtualization also enables the Audi IT Services Department to respond faster and more cost- effectively to new requirements

from the business. Where it might previously have taken days or even weeks to procure, install and set up a new physical server, Audi can create new virtual servers within minutes, fully configured and ready to install new applications on.

"The ability to turn on and off additional server resources is a great benefit, and we make active use of this feature of IBM Power Systems," says Markus Wierl. "We can add resources on a day-by-day basis as we need them, and pay for the additional capacity on a monthly basis."

The IBM private cloud ready solution includes integrated management and provisioning tools, enabling an approach to systems management that is more business-centric rather than IT-centric. To implement cloud functionality a proof of concept was successfully done with some use cases in 2011. At the end of 2011 the implementation of cloud functionality to support the IT operations team started.

Rather than spending time and effort managing a disparate set of hardware, Audi now has an efficient, compact and highly standardized infrastructure that requires little physical maintenance and that is managed by IBM. What's

more, the cloud concept allows a group of physically separate hardware resources to be orchestrated and managed as a single pool of virtualized resources. As Audi continues to expand the SAP environment, it is also further developing the management of cloud and embedding the new management processes into its organization.

Rapid results

Almost immediately after the migration, Audi began to see the benefits of its strategic decision to run SAP on IBM Power Systems with IBM DB2. The professional IBM migration specialists met the Audi timeline.

One of the DB2 databases, a 2.8 TB database for the SAP NetWeaver® Business Warehouse, is split into eight partitions using the database partitioning feature (DPF). This provides a shared-nothing architecture that offers greater scalability, with the ability to spread the database across multiple virtual or physical machines to use their resources.

The Oracle DBAs at Audi took a one week internal training course in DB2, and were then coached by IBM DB2 experts to be capable of managing the SAP base operations.

Data protection

Audi is using IBM Database Encryption Expert software help protect sensitive data associated with its SAP E-Recruiting system. IBM Database Encryption Expert includes centralized policy and key management to simplify data security management, and helps Audi to maintain and demonstrate compliance with internal audit regulations and external laws.

Supporting business excellence

With the IBM private cloud ready infrastructure underpinning its SAP systems, Audi has a robust, high-performance platform for managing its business operations that also offers superb flexibility. As the company tackles increasing competition the ability to expand and contract its SAP solutions in line with changing patterns of demand will help Audi to ensure that it has the right IT resources in place, at the right cost of ownership.

The IBM private cloud-ready infrastructure now runs the entire SAP landscape at Audi, serving practically a lot of business and supporting core business processes. From January 2011, operational support for production systems was handed to a team of IBM Global Technology Services as planned.

"We trust the IBM infrastructure to run our production systems, which are absolutely business-critical," says Markus Wierl. "Any significant unplanned downtime could lead to a stoppage on our production lines. Modern automotive manufacturing is based on just-in-time concepts, and involves a large and complex partner ecosystem. So any minor disruption to production can rapidly turn into a major problem for multiple parties. For this reason, we highly value the robustness and availability of the IBM Power Systems and BladeCenter technology for our SAP solutions."